AF/1752

MS APPEAL BRIEF - PATENTS
PATENT
2185-0343P

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of		Before the Board of Appeals	
Yasunori UETANI et al.		Appeal No.:	
Appl. No.:	09/323,230	Group:	1752
Filed:	June 1, 1999	Examiner:	CHU, J.
Conf.:	8929		
For:	A POSITIVE RESIST COMPOSITION		

APPEAL BRIEF TRANSMITTAL FORM

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

November 4, 2003

Sir:

Transmitted herewith is an Appeal Brief (in triplicate) on behalf of the Appellants in connection with the above-identified application.

☐ The enclosed document is being transmitted via the Certificate of Mailing provisions of 37 C.F.R. § 1.8.

A Notice of Appeal was filed on April 4, 2003.

☐ Applicant claims small entity status in accordance with 37 C.F.R. § 1.27

The fee has been calculated as shown below:

☒ Extension of time fee pursuant to 37 C.F.R. §§ 1.17 and 1.136(a) - $2,010.00 - five (5) months (large entity)

☒ Fee for filing an Appeal Brief - $330.00 (large entity).

☒ Check(s) in the amount of $2,340.00 is(are) attached.

☐ Please charge Deposit Account No. 02-2448 in the amount of $0.00. A triplicate copy of this sheet is attached.

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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By _____
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(Rev. 09/30/03)

PATENT
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Applicant:	Y. Uetani et al.	Conf.:	8929
Appl. No.:	09/323,230	Group:	1752
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For:	A POSITIVE RESIST COMPOSITION		

APPEAL BRIEF

Assistant Commissioner for Patents
Washington, DC 20231

November 4, 2003

Sir:

In response to the Examiner's Office Actions dated December 4, 2002, the following Appeal Brief is respectfully submitted in connection with the above-identified application.

TABLE OF CONTENTS

I. Real Party in Interest

The real party in interest of the present invention is Sumitomo Chemical Co., Ltd. Of Osaka, Japan, the assignee of the entire right and interest of the instant application. The assignment of said right and interest was recorded on July 15, 1999 at Reel 010091, Frame 0880.

II. Related Appeals and Interferences

There are no related appeals or interferences pending for the present application.

III. Status of Claims

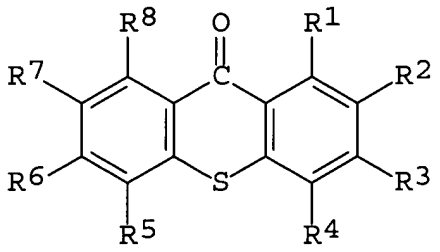
Claims 1 and 6-9 are pending in the present application. Claims 1 and 6-9 are rejected under 35 USC §103. Thus, the rejections concerning claims 1 and 6-9 are appealed.

IV. Status of Amendments

No after-final responses have been filed after the Examiner's final rejection of claims 1 and 6-9 on December 4, 2002. Thus, claims 1 and 6-9 as appealed are the claims that are currently pending.

V. Summary of Invention

The present invention relates to an article comprising a substrate comprising a silicon wafer and a positive resist composition comprising a novolac resin (page 1, lines 4-8) ; an o-quinonediazide sulfonic acid ester of a compound having a phenolic hydroxyl group (page 6, line 13); and a thioxanthone compound represented by the following formula (I) (page 3, lines 1-4):



(I)

wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8 independently represent hydrogen, halogen, alkyl, alkoxy, aryl, carboxyl or alkoxycarbonyl.

VI. Issues to be considered

Issue 1

Has the Examiner made a proper rejection of claims 1 and 6-9 under 35 USC §103(a) over Tachikawa '255 (US Patent No. 4,356,255) in view of Aoai '143 (US Patent No. 5,576,143)?

VII. Grouping of Claims

Appellants respectfully request that the claims be grouped as follows.

Group I - claims 1, 8, and 9

Group II - claims 6 and 7

Group I -Issue 1

Group II - Issue 1

VIII. Arguments

Issue 1

The Examiner has failed to make a proper rejection of claims 1 and 6-9 under 35 USC §103(a) over Tachikawa '255 (US Patent No. 4,356,255) in view of Aoai '143 (US Patent No. 5,576,143)

Appellants submit that the Examiner has failed to make out a *prima facie* case of obviousness with regard to the 35 USC §103(a) rejection over Tachikawa '255 in view of Aoai '143. Three criteria must be met to make out a *prima facie* case of obviousness.

1) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.
2) There must be a reasonable expectation of success.
3) The prior art reference (or references when combined) must teach or suggest all the claim limitations.

See MPEP §2142 and *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991). In particular, the Examiner has failed to meet the first element to make a *prima facie* obviousness rejection. Appellants assert that the motivation to combine Tachikawa '255 and Aoai '143 is lacking.

The Examiner asserts that a *prima facie* case of obviousness over Tachikawa '255 in view of Aoai '143 has been made. Appellants, however, disagree. Appellants submit that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. This is apparent when one considers the following.

The Examiner asserts that Tachikawa '255 discloses a photosensitive composition comprising a quinonediazide compound and a sensitizer. The Examiner points to column 3, lines 3-15 in Tachikawa '255 wherein a list of sensitizers are disclosed (see in particular line 12). The Examiner acknowledges that Tachikawa '255 lacks the explicit use of a silicon wafer as a substrate to coat the photosensitive composition (see page 3, lines 3-4 of the Office Action of December 4, 2002). Appellants submit that not only does Tachikawa '255 not explicitly use a silicon wafer, Tachikawa '255 does not even remotely mention a silicon wafer. There is no mention of the word "silicon" or "wafer" anywhere in Tachikawa '255.

However, the Examiner points to Aoai '143 for the teaching of a silicon wafer. Appellants, however, submit that there is neither suggestion nor motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.

Aoai '143 relates to what is known in the art as chemical amplification type resists. In particular, chemical amplification type resists (Aoai '143) comprise an acid generator that generates an acid by irradiation. The generated acid changes the solubility of the resin. In contrast, the positive resist (instant invention and Tachikawa '255) do not comprise this acid generator, the quinonediazide sulfonic acid compound is decomposed (which is not the case in Aoai '143) and becomes soluble in alkali. Thus, the instant invention (as a positive resist) generally starts as insoluble but then after irradiation becomes soluble in alkali. As can be seen from this description, the mechanism of action for photo-sensitivity of the two types of resists are vastly different, and one of ordinary skill in the art would never use the teaching in Tachikawa '255 and impart it upon the teachings of a chemical amplification resist or vice versa.

In the Office Action of December 4, 2002, the Examiner states:

AOAI ET AL '143 disclosed in the FIELD OF THE INVENTION (col, 1, lines 26-32) that photosensitive compositions can be used as photoresist compositions or lithographic printing plates wherein the application of the photosensitive composition would decide the substrate to be coated, such that a silicon wafer and a printing plate substrate are analogous based on the desired application.

Appellants do not disagree that the composition that is disclosed in Aoai '143 can be used for photoresist compositions or for photosensitive lithographic plates. However, Appellants submit that because the mechanism of action to generate photo-sensitivity between the chemical amplification type resist disclosed in Aoai '143 and the positive resist of the instant invention are drastically different, one cannot impart any teaching from the disclosure of Aoai '143 onto a positive resist. The differences in a positive resist composition and a chemical amplification type resist are not insubstantial.

Moreover, the Examiner states in the Office Action on page 3, lines 5-9 of the Office Action

TACHIKAWA ET AL. fails to explicitly disclose the presence of a sensitizer as claimed such as thioxanthone, however the use of sensitizers is to expand the spectral range and the [SIC] activate the acid generators are well known and can easily be added to provide known and expected results.

Appellants, however, point out that this motivation is erroneous. In making a positive resist composition, one never tries to expand the spectral range or to activate acid generators. With positive resist compositions, one's main concern is with resolution and

attempts to improve this resolution. Thus, Appellants assert that the Examiner's motivation to add thioxanthone to the positive resist is inapposite. Accordingly, Appellants submit that the Examiner has failed to establish a proper *prima facie* case of obviousness by combining Tachikawa '255 with Aoai '143.

Moreover, Tachikawa '255 fails to disclose or suggest a novolac resin. A novolac resin is usually made by condensing a phenol with an aldehyde in the presence of an acid catalyst (please see page 3, lines 13-15 in the instant written description). Nowhere does Tachikawa '255 disclose or suggest a novolac resin. Tachikawa '255, at column 3, lines 25-33 states:

> *Incorporation of resinous materials which are compatible with the above-cited essential ingredients and which are exemplified by styrene/maleic anhydride copolymer, styrene/acrylic acid copolymer, methyl methacrylate/methacrylic acid copolymer, etc., can improve the mechanical strength of the resulting image or pattern. Further explanations for these techniques will not be provided since they are well known to those skilled in the art.*

From the groups of resinous materials taught by Tachikawa '255, it would be apparent to those of ordinary skill that Tachikawa '255 did not contemplate using a novolac type resin. Nowhere in Tachikawa '255 is there even the remotest suggestion of using a novolac type resin. Further, one of ordinary skill in the art would be motivated to use one of the resins disclosed by Tachikawa '255 to improve the mechanical strength of the resulting image or

pattern. One of ordinary skill in the art would not be motivated to use a resin that is not even disclosed by Tachikawa '255.

Appellants respectfully point out that Aoai '143 does, however, disclose a novolac (novolak) resin (see column 25, line 54). However, as mentioned above, because the mechanism of action in a chemical amplification resist is drastically different from a positive resist, one of ordinary skill in the art would never be motivated to combine these teachings and use the novolac resin as disclosed in Aoai '143.

Further, Appellants respectfully submit that one would be "picking and choosing" ingredients from two very disparate references to arrive at the instant invention if one were to combine the novolac resin and the silicon wafer of Aoai '143 with the o-quinonediazide sulfonic acid ester of a compound having a phenolic hydroxyl group and the thioxanthone compound of Tachikawa '255. In other words, it would be necessary for one of ordinary skill in the art to completely ignore the resins taught in Tachikawa '255 to pick the novolac resin that is taught Aoai '143. Appellants submit that the artisan of ordinary skill would not do this. Accordingly, Appellants submit that a *prima facie* case of obviousness has not been made with respect to claims 1, 8, and 9.

Regarding claims 6 and 7, neither of Tachikawa '255 nor Aoai '143 disclose or suggest the positive resist composition in claim 6 wherein the amount of components of the novolac resin having a

molecular weight of 1,000 or less is 25% or less based on the total amount of the novolac resin excluding unreacted phenol compound or the element of claim 7 wherein the positive resist composition further comprises a low molecular weight alkali-soluble phenol compound in an amount within a range of 3 to 40% by weight based on the total amount of the novolac resin and the low molecular weight alkali-soluble phenol compound. Accordingly, the Examiner has also failed to make a *prima face* case of obviousness regarding claims 6 and 7 over Tachikawa '255 and Aoai '143.

Even if a *prima facie* case of obviousness were established (which Appellants do not concede) so that one of ordinary skill in the art would add thioxanthone to the positive resist composition, the instant invention has unexpectedly superior properties that could never be ascertained by the addition of thioxanthone. In particular, the table at the top of page 15 shows that the addition of thioxanthone leads to a composition that has higher resolution than compositions that do not have thioxanthone. Please note the differences in the Examples (that contain thioxanthone) and the Comparative Examples (that do not contain thioxanthone). For the honorable Board's benefit, this table is reproduced as Appendix B. Thus, for this reason, the rejection is also inapposite. Reversal of the rejection of claims 1 and 6-9 over Tachikawa '255 and Aoai '143 is respectfully requested.

IX. Conclusion

For the reasons advanced above, it is respectfully submitted that all claims in this application are allowable. Thus, favorable reconsideration and reversal of the Examiner's rejection of claims 1 and 6-9 for obviousness by the Honorable Board of Patent Appeals and Interferences, is respectfully solicited.

The required Appeal Brief fee in the amount of $320.00 and a five-month extension fee in the amount of $2010.00 are attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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By: _____
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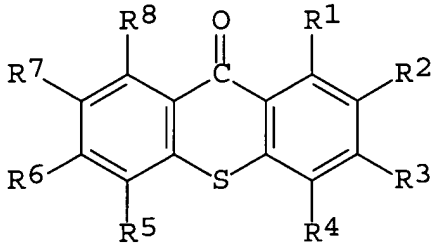
Attachment: APPENDICES A and B

X. Appendix A(Appealed claims)

1. An article comprising a substrate comprising a silicon wafer and a positive resist composition comprising a novolac resin; an o-quinonediazide sulfonic acid ester of a compound having a phenolic hydroxyl group; and a thioxanthone compound represented by the following formula(I):



(I)

wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8 independently represent hydrogen, halogen, alkyl, alkoxy, aryl, carboxyl or alkoxycarbonyl.

6. The article of claim 1, wherein in the positive resist composition the amount of components of the novolac resin having a molecular weight of 1,000 or less is 25% or less based on the total amount of the novolac resin excluding unreacted phenol

compound, the amounts being represented by the pattern areas of gel permeation chromatography, wherein the pattern areas refer to values measured by an UV detector at 254 nm and the molecular weight refers to a value based on that of polystyrene as a standard.

7. The article of claim 1, wherein the positive resist composition which further comprises a low molecular weight alkali-soluble phenol compound in an amount within a range of 3 to 40% by weight based on the total amount of the novolac resin and the low molecular weight alkali-soluble phenol compound.

8. The article of claim 1, wherein in the positive resist composition the thioxanthone compound of the formula (I) is selected from thioxanthone, 1-chlorothioxanthone, 2-chlorothioxanthone, 3-chlorothioxanthone, 4-chlorothioxanthone, 1-methylthioxanthone, 2-methylthioxanthone, 3-methylthioxanthone, 4-methylthioxanthone, 1-ethylthioxanthone, 2-ethylthioxanthone, 3-ethylthioxanthone, 4-ethylthioxanthone, 1-isopropylthioxanthone, 2-isopropylthioxanthone, 3-isopropylthioxanthone, 4-isopropylthioxanthone, methyl thioxanthone-1-carboxylate or methyl 7-methylthioxanthone-3-carboxylate.

9. The article of claim 1, wherein in the positive resist composition the amount of the thioxanthone compound is from about 0.01 to about 5 parts by weight based on 100 parts by total weight of the novolac resin and a low molecular weight alkali-soluble phenol compound.

Appendix B

No.	Resin	Thioxanthone compound	Effective Sensitivity	Resolution
Example 1	A/B =30/70	0.2 part D	310 msec	0.255 μm
Example 2	A/B =30/70	0.2 part E	350 msec	0.25 μm
Example 3	A/B =30/70	0.2 part F	350 msec	0.25 μm
Example 4	A/B =15/85	0.3 part F	350 msec	0.25 μm
Comparative Example 1	A/B =30/70	Not used	200 msec	0.30 μm
Comparative Example 2	A/B =60/40	Not used	360 msec	0.27 μm

D -thioxanthone
E - 2-chlorothioxanthone
F - mixture of 2-isopropylthioxanthone and 4-isopropylthioxanthone